NURTURING AGROFORESTRY SYSTEMS IN FLANDERS: AN AGRICULTURAL INNOVATION SYSTEM APPROACH

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Introduction

Historically a lot of naturally integrated land use systems existed in Flanders, the northern region of Belgium. However, many trees and hedgerows on and between agricultural plots have disappeared because of, amongst others, scale enlargement and intensification. Currently though more attention is given to the value of modern and traditional forms of agroforestry systems, which deliver not only wood and food products but also a lot of ecosystem services. Therefore, since 2011 the Flemish government supports agroforestry through a subsidy program including a payment of 80% of the plantation costs and through the eligibility of agroforestry as Ecological Focus Area in the context of the EU greening requirements. Furthermore, some research groups and civil society organizations are promoting agroforestry through communication activities such as study days and articles in magazines targeted towards farmers. Despite the fact that the amount of applications for the subsidy program is increasing every year, farmers' interests remain low with only about 100 ha that were planted between 2011 and 2015, compared to a target in the Rural Development Program of 250 ha by the end of 2013. This learns that supporting the shift from conventional to more sustainable practices in agriculture is not simple nor obvious.

Increasingly it is recognized that, in order to nurture diversified farming systems such as agroforestry systems, multi-domain and multi-level changes are needed. Indeed, most of the current efforts to promote agroforestry systems occur very close to the producer, i.e. the farmers, because we know that ultimately it is the farmer who decides to implement agroforestry or not. Yet, farming occurs in a social, technical and ecological environment, and structures and practices elsewhere in this environment greatly affect which farming systems thrive and which farming systems remain a niche. As such, in order to design policies and to develop governance structures to foster the adoption of agroforestry systems, the current functioning of agriculture, its actors, structures and practices with respect to agroforestry must be thoroughly investigated.

Methodology

Research approach

A framework that offers a flexible means to deal with the varied conditions and contexts in which the adoption of innovations and the change to more diversified farming systems must occur is the 'Agricultural Innovation System' (AIS) approach. AIS are defined as "a network of organizations, enterprises, and individuals focused on bringing new products, new processes and new forms of organization into economic use together with the institutions and policies that affect the way different agents interact, share, access, exchange and use knowledge" (Hall et al 2006). The only weakness of this definition is that it still suggests that there is a somehow a common goal or focus, whereas the goals, interests and perspectives of interdependent actors are likely to diverge and be conflictive (Klerkx et al 2012). As such the AIS perspective wants to provide a comprehensive view on the multiple actors and factors that co-determine innovation, and as such allow for the understanding of the complexity of agricultural innovations (Klerkx et al 2012).

A central insight of the AIS framework is that partnerships and linkages must be analyzed in their historical and contemporary context, for that context greatly defines the opportunities and necessities for change. To assess this context, a framework of analysis was developed, which includes four elements (Rajalahti et al 2008):

Key actors and their roles, with an emphasis of the diversity of public and private sector actors and the appropriateness of their roles

Attitudes and practices of the main actors, with an emphasis on ways of working, views on collaboration, traditional roles, potential inefficiencies, patterns of trust, risk taking, and the existence of a culture of innovation

The patterns of interaction, with an emphasis on formal and informal networks, links and partnerships

The enabling environment (policies and infrastructure), with an emphasis on the role of policies related to science, technology and fiscal concerns, the role of farmer and other organizations in defining research and innovation challenges; and the significance of legal frameworks

Data collection and analysis

Between July and November 2015 qualitative data were collected through interviews and focus groups. Selection of the respondents happened first of all on the basis of expert knowledge and participation in previous agroforestry activities. Furthermore new respondents were selected through a snowball sampling technique: each respondent was asked which other actors should be involved, and this resulted in new contacts and new respondents. In total 25 interviews were carried out with the help of interview guides containing questions structured around four themes: (1) knowledge, feasibility and desirability, and barriers and enabling factors; (2) impact of agroforestry development on the stakeholder; (3) influence of the stakeholder on agroforestry development and (4) other important stakeholders and their characteristics. After the interviews, in November 2015, two focus groups were organized in which 16 people participated. The specific goal of the focus groups was to explore more in depth stakeholders' thoughts and opinions, and uncover new information as respondents now had the possibility to react on and discuss with each other. Therefore the focus groups were composed as diverse as possible, with an equal distribution of the respondents among the different identified stakeholder categories. To generate discussion a typical tool of stakeholder analysis was used, i.e. the interest-influence matrix (Bryson 2004; Reed et al 2009), a two-by-two matrix where the dimensions represent stakeholders' interests and influence. This interests-influence diagram was used in the two main parts of the focus groups, which were (1) a short individual exercise in which the participants had to position the different stakeholder groups on the diagram according to their interests/influence; and (2) a large group discussion in which one by one the different actors and stakeholder groups were discussed. The qualitative data were as soon as possible transcribed and afterwards processed and analyzed in Nvivo 11, a software for qualitative data analysis. Also some supporting data were collected and analyzed, such as the notes taken during the interviews and the individual interest-influence diagrams drafted by the participants of the focus groups.

Results: Key actors, their attitudes and practices and patterns of interaction

In total 15 stakeholder groups were defined which were grouped in 5 larger stakeholder groups, here called domains. Together they form the agroforestry innovation system, which is mapped in Figure 1 and this according to the conceptual diagram originally presented by Arnold and Bell (2001), and adapted by Spielman and Birner (2008).

The domain at the left hand side of Figure 1 includes the *agricultural research and education institutions*, as well at European level as at Flemish level. According to the respondents, research and education institutions are quite important for agroforestry development, because there is a great need for more local scientific data on productivity and profitability of agroforestry systems. Although research organizations are starting to take up the theme of agroecology and sustainable farming techniques, still a large majority of the research efforts is going to conventional agriculture.

The second domain is shown on the right hand side of Figure 1 and shows the *value chain actors*, from producers up to consumers. Farmers are of course important and are at the center of the decision making process. Their interests in agroforestry are up till now rather low, and this because of the legal uncertainty, the economic uncertainty and the assumed extra labor and complexity of agroforestry in comparison with conventional farming systems. Regarding the future the actors in the value chain are considered important, because to really make agroforestry more widely implemented in Flanders, agroforestry has to become an economic story where all actors take up their role. At the moment though most of the actors do not know about agroforestry systems, especially more down the end of the value chain. Also direct buyers of agroforestry products are little concerned because the existing agroforestry systems are still very young.

In the middle of the agroforestry innovation system, presented in Figure 1, are the *bridging institutions*, of which the main goal is to facilitate the transfer of knowledge and information between the other domains. A very important stakeholder group in this domain are the farmer organizations, which tasks are to lobby and try to influence agricultural policy in one direction, and to help, advise and inform farmers in the other direction. Civil society organizations operate in the same way as farmer organizations but focus on other themes and topics, of which the most important for agroforestry development are nature and environment, landscape and heritage and agroecology and sustainable farming techniques. Different than farmer organizations they are targeting the broader society, with the goal to create a platform and support base for their theme. Also extension centers and cities and municipalities belong to this domain, and are considered the bridge between respectively research institutions and value

chain actors; and government institutions and value chain actors/society. Overall the bridging institutions have a very nuanced view on agroforestry and are asking for more scientific data on the added value of agroforestry systems for the farmer and the broader society.
Whereas the original AIS diagram only includes government institutions and society through frame conditions (Spielman and Birner 2008), they were here added to the diagram as domains, and this because they were also regarded by the respondents as fully fledged stakeholders. *Government institutions* were considered very influential on agroforestry development, because they are able to solve the current legal uncertainty with respect to trees on farmand and provide incentives such as the current subsidy for the installation of agroforestry plots. Since the Flemish agricultural policy is largely steered by the European pol:icy, also the European government plays a significant role. With respect to *society*, there are some specific groups that may come into contact with agroforestry, such as local residents and landowners. While citizens overall may be in favor of a more varied landscape, agroforestry systems may also impact negatively on open views and as such lead to resistance of neighbours and local residents. Also landowners are rather opposed to the planting of trees by the farmer on their farmland, fearing that trees will lead to a devaluation of their farmland.

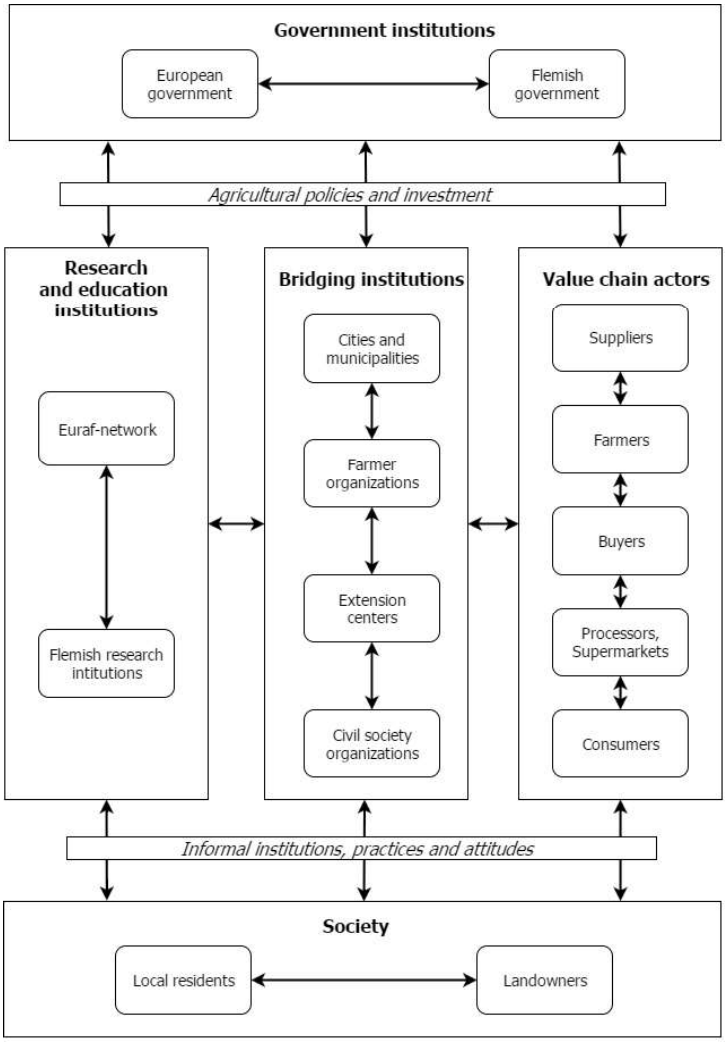

Figure 1: The agroforestry innovation system

Discussion: An enabling environment?
The above analysis led to the identification of four groups of challenges – economic, technical, legal and social – which impede the breaktrough of agroforestry systems today in Flanders and the potential roles of the different actors in overcoming these challenges.
Economic challenges refer to the fact that there are a lot of questions about the profitability of agroforestry systems. The long rotation period of the trees makes agroforestry a very uncertain investment. Nobody can predict which outlets will exist, and which prices one will get for specific agroforestry-products such as high quality timber, nuts and fruits. Without having an idea about the financial returns, it is very difficult for farmers to invest in such a long-term project. As such there is a a lotdemand for more clarity on and scientific data about the (economic) feasibility of

agroforestry in Flanders. Research has an important role to play in answering these questions, whereas funding for research has to come from local or national government.

Technical challenges refer to the negative impact of agroforestry on farm management. Respondents are convinced that agroforestry is more complex and needs more labour. They thought that agroforestry, in general, is not a very appropriate farming system for Flanders since agricultural plots are already small would be further divided by applying agroforestry. Additionally there is a very high pressure on land in Flanders leading to high land prices, and application of agroforestry would mean that a part of this expensive and fertile farmland would not be available anymore for the cultivation of crops. Research can partially solve these problems, by e.g. demonstrating that tree-rows can be spaced at widths perfectly suited to existing machinery. Also farmer organizations can help by coming up with new practical farm management models and providing additional support to agroforestry adopters.

Legal uncertainties make up the third challenge. Although the Flemish government is working hard to iron out the kinks in the legislation, agroforestry pioneers still need to apply for a felling permit. This means that they are not 100% sure that they will be able to harvest the trees at the end of the rotation without replanting them, leading to a devaluation of farmland with trees. Therefore landowners are also very reluctant to give farmers permission to start with agroforestry, this while a majority of the farmland in Flanders is being leased. Many farmers also distrust Government because of their previous negative experiences. Investing in schemes to encourage nature on their farm can lead to more control, supervision and administration: things that they prefer to avoid. Thus Government has to continue to clarify the place of agroforestry in the existing legislation and the tenancy law.

Social challenges refer to the fact that agroforestry is not always desired by stakeholders, for a number of reasons: it can have a negative impact on birds nesting in open fields, more trees may not reflect the historic character of a certain region, and may impact negatively on landscapes and open views. Additionally, people may not yet understand that value which agroforestry may have for society. Government and civil society need to work with pioneer farmers to provide positive examples of agroforestry, and farmers can be allowed some latitude from the normal rules if they are participating in these participative trials. Projects benefiting from agroforestry subsidies should be monitored for their impacts on biodiversity, landscape and compliance with the historical character of the region.

Conclusion

Analyzing the agroforestry innovation system led to the identification of 15 important actors, and four groups of challenges limiting the uptake of agroforestry systems by farmers. The analysis showed that, in order for agroforestry to breakthrough, change not only has to be brought by farmers, but by all relevant actors at different levels. This information can be used to design more effective policy interventions to further foster the uptake of agroforestry in Flanders.

References:

Arnold E, Bell M (2001) “Some New Ideas about Research and Development.” Copenhagen

Bryson JM (2004) What to do when Stakeholders matter. Public Manag Rev 6:21–53. doi: 10.1080/14719030410001675722

Hall A, Janssen W, Pehu E, Rajalahti R (2006) Enhancing Agricultural Innovation: How to go beyond the strengthening of research systems. doi: 10.1596/978-0-8213-6741-4

Klerkx L, van Mierlo B, Cees L (2012) Evolution of systems approaches to agricultural innovation, concepts analysis and interventions. Farming Syst. Res. into 21st Century New Dyn. pp 159–177

Rajalahti R, Janssen W, Pehu E (2008) Agricultural Innovation Systems : From Diagnostics toward Operational Practices Systems. Agric Rural Dev 87.

Reed MS, Graves A, Dandy N, et al (2009) Who’s in and why? A typology of stakeholder analysis methods for natural resource management. J Environ Manage 90:1933–49. doi: 10.1016/j.jenvman.2009.01.001

Spielman D, Birner R (2008) How Innovative Is Your Agriculture ? Using Innovation Indicators and Benchmarks to Strengthen National.